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SOUTHEASTERN COOPERATIVE WILDLIFE DISEASE STUDY



COLLEGE OF VETERINARY MEDICINE
THE UNIVERSITY OF GEORGIA
ATHENS, GEORGIA 30602-7393

TELEPHONE
(706) 542-1741

FAX
(706) 542-5865

COPY

December 4, 2001

RECEIVED

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Mr. Pat Stinson
U.S. Fish and Wildlife Service
Wildlife Habitat Management Office
6578 Dogwood View Parkway, Suite B
Jackson, Mississippi 39213

Yazoo National Wildlife Refuge

Dear Pat:

Enclosed are our reports on the deer herd health evaluations that we conducted at Yazoo National Wildlife Refuge, Washington County, Mississippi, and Panther Swamp National Wildlife Refuge, Yazoo County, Mississippi, on August 20-21, 2001. The health evaluations involved examination of five and six adult deer, respectively. The data for each Refuge are arranged into a series of tables (parasitologic, serologic and microbiologic/histologic, and pathologic information) and are accompanied by interpretive comments. The interpretive comments focus on the current, and future status of herd health due to the two major disease problems of southeastern deer: 1) a syndrome of parasitism/malnutrition which tends to be largely dependent on deer density, and 2) hemorrhagic disease which is less clearly linked to deer density. In addition, we have conducted tests for selected diseases that are either important concerns for deer health or major domestic livestock diseases.

Yazoo NWR: Our evaluation did not disclose evidence of health problems due to parasitism/nutritional stress, and based on APC and other data, the herd is near nutritional carrying capacity. Antibody testing disclosed a moderate level of herd immunity to one or more hemorrhagic disease viruses. Serologic testing does not provide information on impact of these infections. Prediction of either the timing or the population impacts of future hemorrhagic disease epizootics is not possible; however, in this general region detectable hemorrhagic disease activity occurs at three to five year intervals. There are no management actions that are known to be helpful in regard to hemorrhagic disease. We did not find evidence of any significant activity by any other diseases important to deer or livestock health.

Panther Swamp NWR: Our evaluation did not disclose evidence of health problems due to parasitism/nutritional stress, and based on APC and other data, the herd also is near nutritional carrying capacity. Antibody testing also disclosed a moderate level of herd immunity to the hemorrhagic disease viruses. Serologic testing does not provide information on impact of these

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infections. Prediction of either the timing or the population impacts of future hemorrhagic disease epizootics is not possible; however, in this general region detectable hemorrhagic disease activity occurs at three to five year intervals. There are no management actions that are known to be helpful in regard to hemorrhagic disease. We did not find evidence of any significant activity by any other diseases important to deer or livestock health.

I trust this information will be of value in management of these deer herds. Additional information on many of the parasites and diseases mentioned in the report can be obtained from our Field Manual of Wildlife Diseases or from our website at www.scwds.org. If you have any questions about the report, please do not hesitate to contact me.

Best regards,

Sincerely,

William R. Davidson, Ph.D.
Professor

WRD:com

Enclosures

CC: · Mr. Tim Wilkins
Mr. W.F. Stevens
Mr. Sam Hamilton
Mr. C. Robert Cooke, Jr.
Dr. E. Frank Bowers
Mr. Larry E. Castle

Table 1. Arthropod, helminth, and protozoan parasites of five white-tailed deer (*Odocoileus virginianus*) collected from Yazoo National Wildlife Refuge, Washington County, Mississippi, on August 21, 2001.

Animal Number	Animal Number					Arthropods				
	1	2	3	4	5	1	2	3	4	5
Age (years)	1.5	2.5	3.5	1.5	3.5	Light	-	-	-	-
Sex	F	F	F	M	F	Light	Light	-	Light	-
Weight (pounds)	100	140	144	130	140	Light	-	-	Light	-
Physical Condition	Good	Good	Good	Good	Good	-	-	-	-	-
Kidney Fat Index	35.6	24.4	19.1	43.8	17.5	-	-	-	-	-
Packed Cell Volume	44	42	42	44	41	Light	Light	-	Moder.	Light
Serum Protein	6.8	6.1	5.9	6.5	6.2					

Location in Host	Helminths	Number of Parasites Per Deer					Range	Prevalence	Average
		1	2	3	4	5			
Helminths									
Subcutaneous									
Brain									
Circulatory									
Thoracic Cavity									
Lungs									
		-	-	-	+	-	-	20%	-
	Setaria yehi (dead worms)	-	20	12	2	2	0-20	80%	7.2
	Dictyocaulus viviparus	-	+	+	-	+	-	60%	-
	Protostrongylid larvae	+	-	-	-	-	-	20%	-
Abdominal Cavity									
Liver		-	3	3	-	5	0-5	60%	2.2
Esophagus									
Rumen									
Abomasum									
	Mazamastrongylus odocoilei	27	50	41	-	-	0-50	60%	23.6
	Mazamastrongylus pursglovei	133	400	616	170	1,118	133-1,118	100%	487.6
	Ostertagia dikmansii	-	50	82	-	134	0-134	60%	53.2
	Ostertagia mossi	160	150	-	85	134	0-160	80%	105.8
	Trichostrongylus axevalli	-	50	41	85	134	0-134	80%	62.0
Protozoans									
Blood									
	Trypanosoma cervi	-	+	+	-	+	-	60%	-

Table 2. Results of serologic tests and microbiologic/histologic assays for selected diseases in five white-tailed deer from Yazoo National Wildlife Refuge, Washington County, Mississippi, on August 21, 2001.

Disease	Deer Number				
	1	2	3	4	5
<u>Serologic Tests</u>					
Leptospirosis					
(serotype <u>bratislava</u>)	Neg	Neg	Neg	Neg	Neg
(serotype <u>pomona</u>)	Neg	Neg	Neg	Neg	Sus
(serotype <u>hardjo</u>)	Neg	Neg	Neg	Neg	Neg
(serotype <u>grippotyphosa</u>)	Neg	Neg	Neg	Neg	Neg
(serotype <u>icterohemorrhagiae</u>)	Neg	Neg	Neg	Neg	Neg
(serotype <u>canicola</u>)	Neg	Neg	Neg	Neg	Neg
Brucellosis	Neg	Neg	Neg	Neg	Neg
Infectious bovine rhinotracheitis (IBR)	Neg	Neg	Neg	Neg	Neg
Bovine virus diarrhea (BVD)	Neg	Neg	Neg	Neg	Neg
Parainfluenza ₃ (PI ₃)	Neg	Neg	Neg	Neg	Neg
Epizootic hemorrhagic disease (EHD)	Neg	Neg	Neg	Wk+	Pos
Bluetongue (BT)	Neg	Neg	Neg	Neg	Wk+
Human monocytotropic ehrlichiosis (<u>E. chaffeensis</u>)	Pos	Pos	Neg	Pos	Neg
Human granulocytotropic ehrlichiosis	Neg	Neg	Neg	Neg	Neg
<u>Microbiologic/Histologic Assays</u>					
Johne's disease ¹	Neg	Neg	Neg	Neg	Neg
Bovine tuberculosis ²	Neg	Neg	Neg	Neg	Neg
Chronic wasting disease ³	Neg	Neg	Neg	Neg	Neg

¹ Culture of feces and mesenteric and ileocecal lymph nodes.

² Gross and microscopic examination of retropharyngeal lymph nodes.

³ Microscopic examination for lesions (H&E) and immunohistochemistry.

Table 3. Lesions and pathologic conditions in five white-tailed deer collected from Yazoo National Wildlife Refuge, Washington County, Mississippi, on August 21, 2001.

Lesion/Condition	Deer Number				
	1	2	3	4	5
Fibrinous pleuritis	1	1	-	2	-
Bronchitis/peribronchitis	-	1	1	1	-
Fibrinous peritonitis	1	-	-	1	-
Focal hepatic fibrosis	-	1	1	-	1
Lymphadenopathy	-	1	-	-	-

*Key: - = lesion or condition not present; 1 = minor tissue damage or mild pathologic change; 2 = moderate tissue damage or moderate pathologic change; 3 = extensive tissue damage or marked pathologic change.

INTERPRETIVE COMMENTS: White-tailed deer collected from Yazoo National Wildlife Refuge, Washington County, Mississippi, on August 21, 2001.

Large lungworms (Dictyocaulus viviparus) present at low to moderate numbers in four deer. Protostrongylid larvae, probably from muscleworms (Parelaphostrongylus andersoni), present in three animals. Large lungworms and protostrongylid larvae associated with mild lung damage (pleuritis, peribronchitis) in four deer. Abomasal parasites (Mazamastrongylus odocoilei, M. purnglovei, Ostertagia dikmansi, O. mossi, Trichostrongylus askivali) at a moderate level (APC = 732) indicating that the herd has a high probability of being near nutritional carrying capacity. Liver flukes (Fascioloides magna) present at low level in three deer and associated with mild liver damage (hepatic fibrosis). Blood protozoans (Trypanosoma cervi) present in three deer but this parasite is not pathogenic. Arthropod parasites (lice, louse flies, ticks, and nasal bots) at levels typical of many deer herds in the Southeast.

Physical condition ratings, kidney fat indices, body weights, and hematologic values were near the median values of healthy deer. In addition to lesions attributable to parasitism (noted above), pathologic studies disclosed nonspecific inflammation of the abdominal cavity (peritonitis) and thoracic cavity (pleuritis) associated with dead degenerating abdominal worms (Setaria yehi) in two deer; the thoracic lesions in Deer 4 were marked but not life threatening. One deer also had mild nonspecific inflammation of the lymph nodes (lymphadenopathy). Serologic tests for antibodies to selected infectious diseases disclosed a weak titer to the pomona serovariety of Leptospira interrogans in one deer, antibodies to the hemorrhagic disease viruses (EHD and BT) in two deer, and three deer with antibodies to Ehrlichia chaffeensis. Antibodies to leptospires are detected occasionally in deer but leptospirosis is not a significant disease of deer. Antibodies to the hemorrhagic disease viruses (EHD and BT) indicate limited activity by these viruses in the past but do not provide information on severity of past infections. The herd currently has only limited immunity to hemorrhagic disease but prediction of the timing or severity of future epizootics is not possible. Antibodies to E. chaffeensis indicate the presence of this tick-borne agent, which is common at locations where the lone star tick (Amblyomma americanum) occurs. The remaining serologic and microbiologic/histologic tests were uniformly negative indicating minimal activity by these diseases within the population.

An overview is as follows: (1) based on APC data the herd probably is near nutritional carrying capacity; (2) the levels of important pathogenic parasites, especially large lungworms, are not at levels sufficient to be of immediate concern; (3) selected viral and bacterial diseases have not had high levels of activity on the area; (4) the overall health status of the herd presently is such that disease-related mortality probably is not occurring to a significant extent. Continuation of current herd density should not result in declines in herd health and higher rates of disease-induced mortality.

Table 1. Arthropod, helminth, and protozoan parasites of six white-tailed deer (*Odocoileus virginianus*) collected from Panther Swamp National Wildlife Refuge, Yazoo County, Mississippi, on August 20, 2001.

Animal Number	1	2	3	4	5	6	Animal Number	Arthropods					
								1	2	3	4	5	6
Age (years)	0.8	4.5	1.5	2.5	1.0	1.0	Lice	Moder.	Light	-	-	-	Light
Sex	F	F	F	F	M	M	Louse Flies	Light	Light	Light	Light	Light	Light
Weight (pounds)	64	140	114	124	98	98	Ticks	Light	Light	Light	Light	Light	Light
Physical Condition	Fair	Fair	Good	Good	Fair	Fair	Chiggers	-	-	-	-	-	-
Kidney Fat Index	9.8	17.5	35.6	11.0	11.1	23.1	Ear Mites	-	-	-	-	-	-
Packed Cell Volume	19	33	40	35	45	42	Nasal Bots	-	-	-	-	Light	Moder
Serum Protein	7.3	6.0	6.6	6.6	6.3	7.9							
Location in Host	Number of Parasites Per Deer						Range	Prevalence	Average				
	1	2	3	4	5	6							
Helminths													
Subcutaneous													
Brain													
Circulatory													
Lungs	Dictyocaulus viviparus	1	1	-	9	-	7	0-9	66.7%	3.0			
	Protostrongylid larvae	+	-	-	+	-	-	-	33.3%	-			
	Setaria yehi (dead)	+	-	-	-	+	-	-	33.3%	-			
Abdominal Cavity	Fascioloides magna	-	3	-	5	-	-	0-5	33.3%	1.3			
Liver	Gongylonema pulchrum	-	-	-	-	-	2	0-2	16.7%	0.3			
Esophagus	Paramphistomum liorchis	-	-	-	-	1	-	0-1	16.7%	0.2			
Rumen	Mazamastrongylus odocoilei	-	-	33	-	-	-	0-33	16.7%	5.5			
Abomasum	Mazamastrongylus pursglovei	945	1,315	328	1,051	432	600	328-1,315	100%	778.5			
APC = (923)	Ostertagia dikmansii	-	55	-	-	-	-	0-55	16.7%	9.2			
	Ostertagia mossi	95	110	66	309	-	120	0-309	83.3%	116.7			
	Trichostrongylus axkivali	-	-	33	-	48	-	0-48	33.4%	13.5			
Protozoans													
Blood	Theileria cervi	+	+	+	+	-	-	-	66.7%	-			

Table 2. Results of serologic tests and microbiologic/histologic assays for selected diseases in six white-tailed deer from Panther Swamp National Wildlife Refuge, Yazoo County, Mississippi, on August 20, 2001

Disease	Deer Number					
	1	2	3	4	5	6
<u>Serologic Tests</u>						
Leptospirosis						
(serotype <u>bratislava</u>)	Neg	Neg	Neg	Neg	Neg	Neg
(serotype <u>pomona</u>)	Neg	Neg	Neg	Neg	Neg	Neg
(serotype <u>hardjo</u>)	Neg	Neg	Neg	Neg	Neg	Neg
(serotype <u>grippotyphosa</u>)	Neg	Neg	Neg	Neg	Neg	Sus
(serotype <u>icterohemorrhagiae</u>)	Neg	Neg	Neg	Neg	Neg	Neg
(serotype <u>canicola</u>)	Neg	Neg	Neg	Neg	Neg	Sus
Brucellosis	Neg	Neg	Neg	Neg	Neg	Neg
Infectious bovine rhinotracheitis (IBR)	Neg	Neg	Neg	Neg	Neg	Neg
Bovine virus diarrhea (BVD)	Neg	Neg	Neg	Neg	Neg	Neg
Parainfluenza ₃ (PI ₃)	Neg	Neg	Neg	Neg	Neg	Neg
Epizootic hemorrhagic disease (EHD)	Pos	Pos	Wk+	Neg	Neg	Neg
Bluetongue (BT)	Pos	Wk+	Wk+	Neg	Neg	Neg
<u>Microbiologic/Histologic Assays</u>						
Johne's Disease ¹	Neg	Neg	Neg	Neg	Neg	Neg
Bovine tuberculosis ²	Neg	Neg	Neg	Neg	Neg	Neg
Chronic wasting disease ³	Neg	Neg	Neg	Neg	Neg	Neg

¹ Culture of feces and mesenteric and ileocecal lymph nodes.

² Gross and microscopic examination of retropharyngeal lymph nodes.

³ Microscopic examination for lesions (H&E) and immunohistochemistry.

Table 3. Lesions and pathologic conditions in six white-tailed deer collected from Panther Swamp National Wildlife Refuge, Yazoo County, Mississippi, on August 20, 2001.

Lesion/Condition	Deer Number					
	1	2	3	4	5	6
Fibrinous pleuritis	2	-	2	1	-	1
Bronchitis/peribronchitis	1	-	2	-	-	1
Pneumonitis	1	-	-	-	-	-
Focal pneumonia	-	-	1	-	-	-
Peritonitis	1	1	-	-	1	1
Focal hepatic fibrosis	-	1	-	1	-	-
Lymphadenopathy	-	-	-	1	-	1

*Key: - = lesion or condition not present; 1 = minor tissue damage or mild pathologic change; 2 = moderate tissue damage or moderate pathologic change; 3 = extensive tissue damage or marked pathologic change.

INTERPRETIVE COMMENTS: White-tailed deer collected from Panther Swamp National Wildlife Refuge, Yazoo County, Mississippi, on August 20, 2001.

Large lungworms (Dictyocaulus viviparus) present at low to moderate numbers in four deer. Protostrongylid larvae, probably from muscleworms (Parclaphostrongylus andersoni), present in two deer. Large lungworms and protostrongylid larvae associated with mild to moderate lung damage (pleuritis, peribronchitis, pneumonitis, and pneumonia) in five deer. Dead, degenerating abdominal worms (Setaria yehi) were present in two deer and were associated with mild inflammation (peritonitis) of the abdominal cavity. Abomasal parasites (Mazamastrongylus odocoilei, M. pурсglovei, Ostertagia dikmansi, O. mossi, Trichostrongylus askivali) at a moderate level (APC = 923) indicating that the herd has a good probability of being in near nutritional carrying capacity. Liver flukes (Fascioloides magna) present at low level in two deer and associated with mild liver damage (hepatic fibrosis). Gullet worms (Gongylonema pulcrum) and rumen flukes (Paramphistomum liorchis) present at low numbers, but not considered important to herd health at the levels encountered. Blood protozoans (Theileria cervi) present in four deer but not considered pathogenic in animals that are otherwise healthy. Arthropod parasites (lice, louse flies, ticks, nasal bots) at levels typical of many deer herds in the Southeast.

Physical condition ratings, kidney fat indices, body weights and hematologic values were variable but generally within the range of values of healthy deer. In addition to lesions attributable to parasitism (noted above), pathologic studies disclosed nonspecific inflammation of the lymph nodes (lymphadenopathy) in two deer. Serologic tests for antibodies to selected infectious diseases disclosed suspect reactions to two serovarieties of Leptospira interrogans in one deer and antibodies to hemorrhagic disease viruses (EHD and BT) in three deer. Leptospiral antibodies are found occasionally in deer but leptospirosis is not a significant disease in this species. Antibodies to EHD and BT viruses indicate prior activity by one or more of the viruses (cross-reactions occur with this test) but do not provide information on the severity of past infections. Currently, the population has a moderate degree of herd immunity, which should afford at least some protection during future epizootics; however, the timing and severity of future viral activity cannot be predicted. The remaining serologic and microbiologic/histologic assays were uniformly negative indicating minimal activity by these diseases within the population.

An overview is as follows: (1) based on APC data the herd probably is near nutritional carrying capacity; (2) the levels of important pathogenic parasites, especially large lungworms, are not at levels sufficient to be of immediate concern; (3) selected viral and bacterial diseases have not had high levels of activity on the area; (4) the overall health status of the herd presently is such that disease-related mortality probably is not occurring to a significant extent at the present time. Continuation of current herd density should not result in declines in herd health and higher rates of disease-induced mortality.